State of Maryland
Maryland Health Care Commission

Feasibility of Using Maryland Hospital Data to Study Health Care Disparities

Extramural Report Series

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Preface

This report contains findings from a project conducted by the Project HOPE Center for Health Affairs under contract #MHCC-02-08 to the Maryland Health Care Commission (formerly the Maryland Health Care Access and Cost Commission). The findings and recommendations detailed in this report are those of the Project HOPE Center for Health Affairs and do not necessarily reflect the views of the Maryland Health Care Commission. The work described in this report has been monitored by MHCC staff monitored the work completed under this task order to ensure compliance with the contract's technical specifications. Comments about this report may be sent to Ben Steffen at the Maryland Health Care Commission, 4201 Patterson Avenue, Baltimore MD 21215 at (410)-764-3570 or via e-mail at bsteffen@mhcc.state.md.us.

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Executive Summary

Despite substantial achievements in health care among the Nation's population, widespread differences remain in terms of illness and patterns of care among racial/ethnic groups and across persons of different socio-economic status. Since 1998, the US Department of Health and Human Services has made a major commitment to reducing and eliminating these health disparities.

The purpose of this task order is to explore the feasibility of using health care administrative data (principally claims and hospital discharge data) collected by the State of Maryland to examine treatment disparities for selected acute health conditions. For the purposes of this report, health disparities are defined as differences in the patterns of health treatments—the kinds and quality of health care--received by different population groups as defined by race/ethnicity, geography, or gender. The task order objectives are accomplished through reviews of previous research on treatment disparities, existing indicators used for assessing disparities, and initiatives to combat disparities. In addition, an assessment of the suitability of available administrative data to address similar issues in the State of Maryland and recommendations concerning specific health conditions for inclusion in an analysis of treatment disparities are also made.

From our examination of the literature, we recommend that MHCC begin with existing quality indicators and examine whether there are differences in these measures across population groups of interest. Using AHRQ's CONQUEST database (Computerized Needs-Oriented Quality Measurement Evaluation System), we have identified those indicators that can be calculated using inpatient administrative data. Eliminating those related to cardiac conditions and focusing on measures that are likely to have adequate sample size for study reduces the number of indicators available. Of those that remain, there are a several good candidates for study based on sample size, estimated charges, and previous studies that identify disparities and/or provide data for comparison. Among the most promising indicators are Cesarean section delivery, hysterectomy rates, rates of laminectomy, and laparoscopic cholecystectomy procedures. Focusing on a small number of these indicators may allow for deeper understanding of mechanisms underlying any disparities found and may also provide greater opportunity to design and implement feasible interventions in response to what is found.

Introduction

Despite substantial achievements in health care among the Nation's population, widespread differences remain in terms of illness and patterns of care among racial/ethnic groups and across persons of different socio-economic status. Since 1998, the US Department of Health and Human Services has made a major commitment to reducing and eliminating these health disparities.

As broadly defined by an NIH-wide working group, health disparities are "differences in the incidence, prevalence, mortality, and burden of disease and other adverse health conditions that exist among specific population groups in the United States." This definition emphasizes health status differences. A recent report by the Institute of Medicine[1] focused on disparities in health *care* rather than in health; its purpose was to assess differences in the kinds and quality of health care received by different groups, looking at the patient-level, provider-level, and system-level factors that influence those differences.

There have been a large number of studies exploring these health care disparities and they have examined differences in treatment and patterns of care for a wide range of health conditions, including asthma, cancer, cerebrovascular disease, diabetes, conditions of the eye, cardiovascular disease, pain and others. Sources of data for these studies have included administrative (claims) records—both inpatient and outpatient, surveys, medical record reviews, and disease registries.

The purpose of this task order is to explore the feasibility of using health care administrative data (principally claims and hospital discharge data) collected by the State of Maryland to examine treatment disparities for selected acute health conditions. These disparities may reflect racial, gender, or geographic differences. As part of the task order, we have conducted a review of previous research on treatment disparities and existing indicators used for assessing disparities. This report contains a brief summary of the review and an assessment of the suitability of available administrative data to address similar issues in the State of Maryland based on that review. Recommendations for the selection of specific health conditions for inclusion in an analysis of treatment disparities are also made.

Approach

Project HOPE Center for Health Affairs (CHA) conducted a multi-pronged literature review to identify conditions suitable for inclusion in an analysis of disparities in treatment within the State of Maryland. The literature review had

[1] *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care,* Institute of Medicine. National Academy Press, Washington, D.C. , 2002.

three primary components. First, staff conducted a review of published literature on health care treatment disparities. This review focused on studies of differences in patterns of care for racial/ethnic, gender, or geographic subgroups. Published literature was identified using PubMed and other electronic search engines, with the focus on those analyses that have been conducted primarily using administrative hospital data. These articles were reviewed and organized based on the following information: study population; study condition; indicators used; and data elements required. In addition, sections of the Dartmouth Atlas,[2] which contains extensive information on regional variation in health care use, and the recent IOM report on health disparities were reviewed. The IOM report was used to provide an overview of the health disparities literature, as a source of additional literature, and to explore specific conditions for possible study. The Dartmouth Atlas project, which has examined variation in discretionary surgeries, supply-sensitive services, and avoidable hospitalizations, was also reviewed as a source of conditions for possible study.

As a second component of the literature review, we systematically examined measure sets that have been compiled by AHRQ in the CONQUEST database, in order to identify available treatment guidelines and quality indicators that could be used in analyzing hospital data. The CONQUEST database is a compilation of clinical performance measures and integrates measures from a number of different sources including AHRQ's Healthcare Cost and Utilization Project, the Joint Commission on the Accreditation of Healthcare Organizations, and the Veterans Administration.

Finally, the literature review also included a search to identify possible strategies that could be pursued when disparities are found. Websites of various U.S. Department of Health and Human Services' agencies and published literature were reviewed to provide a broad overview of potential methods to reduce disparities, with emphasis on collaborative efforts among state and local government bodies, organizational and individual providers, and consumers.

Using information gathered from the literature reviews, we provide an overview of the different approaches that have been employed in studying health care disparities and an assessment of how available data can be used to analyze health disparities in Maryland. We focus primarily on the use of hospital discharge data; thus, our emphasis is on acute health conditions—defined for the purposes of this study as those conditions for which substantial treatment occurs in an inpatient hospital setting. Cardiac-related conditions are largely excluded,

[2] *The Quality of Medical Care in the United States: A Report on the Medicare Program, The Dartmouth Atlas of Health Care 1999*, Dartmouth Medical School, Center for the Evaluative Clinical Sciences, Dartmouth Medical School, and www.dartmouthatlas.org

as specified in the statement of work; however, we included a limited number in the review because of their large presence in the literature. Alternative approaches to the analysis are identified along with limitations of the approaches. Specific health conditions and indicators that might be considered for analysis and the suitability for study of the various conditions are discussed. The assessment is loosely based, to the extent that the information is readily available, on the following criteria:

a. the significance of the condition in terms of persons affected or cost to the health care system,
b. the strength of existing quality indicators for assessing variations in treatment of particular conditions, and
c. the availability of MHCC data to support construction of the indicators,
d. previous studies indicating that disparities may exist,
e. likelihood that findings of disparities could lead to policy initiative, and
f. availability of benchmarks or comparison data.

Findings

Project HOPE literature review. Approximately 100 published studies of health care disparities were identified and about 50 reviewed as part of the first component of the literature review. Findings from the most relevant studies covered in the literature review are provided in Table A1, in the Appendix. The table is organized by the health condition studied (where applicable) and information is provided on the study population, the indicators used to assess whether there are health care disparities, the data elements required for the study, and the citation.

The vast majority of the studies reviewed looked at racial disparities in health care, primarily examining differences between blacks and whites. Only one of the studies (Harris et al., 1997) analyzed gender, along with racial, differences and two of the articles (Andrews and Elixhauser, 2000; Roetzheim et al., 2000) reported on variation in care for Hispanics as compared to non-Hispanic whites (and, in one of the cases, non-Hispanic blacks as well). The Dartmouth Atlas reports primarily on geographic variation, though the emphasis is on differences in supply of health care resources and practice patterns rather than disparities as the term is currently used. Gornick et al. (1996) incorporated measures of socio-economic status (based on median income at the zip code level) and Roetzheim and colleagues examined insurance status, but racial differences were the primary focus of the analyses. As noted below, the IOM study focused exclusively on racial/ethnic disparities. This may be due to the fact that the

impetus at the federal level was mainly from differences observed in health status and treatment among different racial/ethnic groups.

In reviewing the studies, we focused our attention on the conditions or indicators used and the data requirements. There appear to be a number of different approaches taken to selecting conditions and/or indicators. Several of the studies do not begin by focusing on particular health conditions, but examine differences in the rates of procedures performed in the population at large. For example, in a study by McBean and Gornick (1993), the study population comprises all elderly Medicare beneficiaries with a hospitalization. In addition to total annual hospital discharges and total annual surgical DRG discharges, McBean and Gornick examined 17 major procedures (age-sex adjusted) and 30-day post admission mortality rates (by procedure). They note that, in using these measures applied to the overall population, some portion of the differences may be due to differences in the level of severity of illness across subgroups and that their approach does not allow control for underlying need, differences in access, or ability to pay for services.

A study by Escarce et al. (1993) is somewhat less applicable to our specific purpose since it relies on Part B Medicare data to examine differences in the use of outpatient medical procedures and tests. Nonetheless, as in the McBean and Gornick analysis, the basic approach is one of choosing a large number of procedures and tests for study (here, 32) based on fairly broad criteria. Procedures and tests were chosen based on the frequency of use by the elderly, or use in treating or diagnosing conditions with high morbidity or mortality. These procedures/tests involved cardiac, cerebrovascular, gastrointestinal, ophthalmologic, orthopedic, general surgical, urologic, and miscellaneous imaging services.

A different approach--used by Harris, Andrews, and Elixhauser (1997)—focuses on a large number (78) of diagnoses or disease categories and studies these in the population 17 or older with at least one hospitalization. They look at whether--for each condition--the patient received a major therapeutic or diagnostic procedure, a minor therapeutic or diagnostic procedure, or no procedure. A somewhat similar study by Andrews and Elixhauser (2000) also examined procedure use for persons 17 or older with at least one hospital stay. In this study, 63 disease categories were analyzed by observing whether a major therapeutic procedure was obtained.

A number of other studies analyze treatment of one specific condition. Ball and Elixhauser (1996) examine variation in treatment for patients hospitalized with colorectal cancer. In order to control for differences in staging and severity, they use several clinical variables to group individual patients within the diagnostic

category. Jha et al. (2001) studied 30-day post-admission mortality rates for 6 diagnoses (pneumonia, angina, congestive heart failure, chronic obstructive pulmonary disease, diabetes, and chronic renal failure). Dominitz et al. (2002) analyzed treatment (surgical resection, chemotherapy, radiation therapy) and survival of patients with distal esophageal cancer.

As part of the literature review, we also referred to the Dartmouth Atlas Project. Because of the extensive breadth of the Project, we focused primarily on the 1999 volume for the literature compiled in Table A1. The Project, in general, emphasizes geographic variation; rates of procedures are examined by hospital referral region with the study population generally consisting of Medicare beneficiaries. Chapter 5 of the 1999 volume provides an analysis of ten surgical procedures—repair of hip fracture, colectomy for colorectal cancer, cholecystectomy, angioplasty, coronary artery bypass surgery, hip replacement, lower extremity bypass surgery, carotid endarterectomy, back surgery, and radical prostatectomy. These ten procedures represented approximately 42 percent of Medicare inpatient surgeries and 44 percent of Medicare reimbursements for surgical care in 1995-6. Differences are reported in terms of geographic variation across procedures; the authors note that rates of use of some procedures vary more because, in clinical practice, they are applied more broadly or to more than one health condition. Underlying illness differences also account for some of the variation, though substantial variation is attributed to differences in physicians' approaches to diagnosis and treatment.

In addition, there are a number of other publications, including state-specific volumes (for Michigan, Pennsylvania, and Virginia), region-specific volumes, and specialty-specific editions. These latter ones examine provider supply and procedure rates for cardiovascular, vascular, and musculoskeletal health care. The vascular health care volume analyzes regional variation in rates of carotid endarterectomy, repair of abdominal aortic aneurysms, major amputation, surgical bypass, angioplasty, lower extremity revascularization, and others. In the musculoskeletal volume, procedures examined include knee arthroscopy, shoulder arthroscopy, total joint replacement, total hip replacement, total knee replacement. The Community Profile Reports contained in the Dartmouth Atlas also provides data on variations in use of discretionary surgery and supply-sensitive procedures, including rates of hospitalizations for joint replacement, CABG, and radical prostatectomy, for hospital referral regions in the state of Maryland.

Review of report by the Institute of Medicine. The recent report by the Institute of Medicine, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*, provides a framework for the study of racial/ethnic health care disparities. Within this framework, there is a comprehensive review of analyses that have

been conducted, a discussion of possible sources of disparities, and identification of interventions to eliminate those disparities. For the purposes of this study, we focused on the IOM's discussions of existing evidence, including the sources of data used for various studies.

The IOM report includes a summary of selected literature on health care disparities, also organized by health condition. The literature review conducted by IOM staff focused on racial/ethnic differences reported in the literature in the past 10 years as well as studies that were able to control, at least somewhat, for insurance status or co-morbidities. The review did not include studies of differences in health status or access to care.

The conditions/topics covered in the review are: analgesia; asthma; cancer; cardiovascular disease; cerebrovascular disease; children's health care; diabetes; emergency services; eye care; gallbladder disease; HIV/AIDS; maternal and infant health; mental health; peripheral vascular disease; pharmacy; physician perceptions; patient perceptions; radiographs; rehabilitative services; renal care and transplantation; general use of services and procedures; vaccination; and women's health.

Some of these topic areas do not fit into the framework of this assessment. Several of the studies related to the use of analgesia, for example, took place in settings other than inpatient hospital and relied on patient assessments of pain (gathered from patient interviews). Physician and patient perceptions cannot be studied with administrative data, and rehabilitative services and vaccinations are often not offered in an acute care (hospital) setting. A majority of the analyses of various types of cancer rely on registry data to provide information on staging and detection. Cancer-related indicators are confounded by the fact that minorities tend to be diagnosed at later stages; while this is a disparity in itself, it makes it more difficult to accurately detect the presence of treatment disparities after diagnosis. Many of the specific items examined under children's health care, maternal and infant health, and women's health care also do not reflect care rendered in an acute inpatient setting

Of interest here, the IOM report emphasizes the limitations of using administrative databases, pointing to the lack of data on co-morbidities, disease severity, or the stage at which the illness was detected. They also note that claims data provide no information on the treatment options presented to the patient (and whether they may have refused treatments) and no indication of socio-economic status.

Despite these limitations, the IOM report covers a large number of studies that use administrative data. It is noted in the IOM report that this literature shows

racial and ethnic differences in cardiovascular care that are 'robust and consistent' across a range of studies and that clinical presentation and disease severity do not explain all of these differences. The report also notes that the more variables that are controlled, the more the differences across groups are minimized. Differences have also been found for treatment of cerebrovascular conditions, though they have not been studied as much as cardiovascular ones. For chronic conditions such as asthma and diabetes, studies have primarily looked at disparities in outpatient process measures or as potentially avoidable hospitalizations. Despite the stated difficulties in studying cancer, several researchers have looked at specific procedures for cancer patients. Ball and Elixhauser (1996) studied colorectal cancer inpatient mortality rates (also diagnostic subgroups and procedure types) using hospital discharge data and Imperato et al., 1996 studied rates of radical prostatectomy using Medicare claims data. Across all conditions, the IOM report emphasizes the importance of controlling for SES, insurance coverage, and hospital characteristics--especially when relying on administrative data.

Review of performance indicators. The most comprehensive compilation of indicators was found to be the Computerized Needs-Oriented Quality Measurement Evaluation System (CONQUEST) database, which contains a total of 1,197 clinical performance measures, representing 53 measure sets. These measure sets were developed and tested by a variety of public and private organizations, including AHRQ, HCFA, JCAHO, and NCQA. Of the 1,197 measures contained in CONQUEST, approximately 367 are in-hospital measures and, of these, 98 rely primarily on administrative data. The database provides details about each measure, including their purpose and use, the specification of the numerator and denominator, analytical considerations (e.g., risk adjusters), and data sources necessary to construct each measure.

Approximately one-half of the CONQUEST indicators that may be constructed with administrative data are measures that were developed by either AHRQ as part of the Healthcare Cost and Utilization Project (HCUP) or by JCAHO as part of their Indicator Measurement System (IMSystem). Initially developed as a tool that states could use to monitor access and quality of care, the HCUP quality indicators focus largely on in-hospital mortality and complications following receipt of selected procedures (e.g., laminectomy, cholecystectomy, hip replacement) or broad procedure categories (e.g., major surgery, invasive vascular procedures). These measures were developed to be used with the type of information found in routine hospital administrative data—diagnoses and procedures, along with information on patient's age, gender, source of admission, and discharge status. A large number of states contribute data to HCUP's State Inpatient Databases (SID), including the State of Maryland. Measures from the JCAHO IMSytem were developed to assess hospital

performance as part of the accreditation process. Similar to the HCUP indicators, many of the JCAHO measures capture rates of inpatient mortality or complications from selected procedures or broad procedure categories. Additionally, JCAHO indicators include measures of length of stay for two procedures (CABG and PTCA) as well as several inpatient measures that emphasize outcome of ambulatory prenatal care (e.g., low birthweight births.)

Of particular interest, included in this subset of CONQUEST indicators are a number of measures that were developed by the Maryland Hospital Association as part of its Quality Indicator Project. These indicators include measures of inpatient mortality (inpatient, neonatal and perioperative), unscheduled readmission or return to a special care unit, and C-section rates. Some of these indicators—including re-admission rates for selected conditions--are included in the Maryland Hospital Performance Evaluation Guide. Statistics are available by hospital, indicating roughly where each hospital falls relative to others, but there appears to be no information on differences by patient characteristics such as race or gender.

While the main goal of the Maryland Hospital Performance Evaluation Guide is to provide information to consumers on specific hospitals, the information provided employs measures that are substantively the same as those used in much of the work that has been conducted related to treatment disparities. Other similar reporting systems have been developed in Maryland that focus on HMOs and nursing homes. These systems provide information that allows for comparisons among institutions and plans, rather than among population subgroups. Once these types of measures have been implemented using Maryland's administrative data systems, however, the application to populations is potentially straightforward.

Similar to the work of the Maryland Hospital Association, a number of other states have played a role in the development of health care quality measures.[3] One of the early projects of this type was an effort to measure hospital quality in the Cleveland area. Three indicators were used—mortality rates, length of stay, and patient satisfaction, for specific diagnostic categories and with risk adjustments used for the first two of the measures. Other initiatives have been undertaken in New York, Pennsylvania, and northern New England, which have developed databases to examine invasive cardiac treatment in those geographic areas. Utah tracks discharges by conditions (e.g., C-sections, low birthweight, hysterectomy) on a hospital-by-hospital basis, and Vermont does so by region within the state.

[3] "States and the State of the Art for Health Care Quality Measurement and Reporting: An Environment Scan," Prepared for the Rhode Island Care Quality Steering Committee, Rhode Island Department of Health, September 1999.

Initiatives. In our review of strategies to reduce or eliminate health care disparities, we first examined some current federal efforts with an eye toward those that could be undertaken on a state or local level. Ideally, these would be collaborative efforts among state and local government bodies, organizational and individual providers, and consumers, with the general purpose of raising awareness about disparities, the consequences of these disparities, and possible avenues for change.

Strategies for eradicating inequalities in health status and treatment are proliferating, usually with multi-pronged approaches. Each of the U.S. DHHS agencies, including each of the Institutes in NIH, have developed plans for eliminating health and health care disparities. As a combined effort of the Institutes and the Office of Research on Minority Health at NIH, a strategic plan was developed to combat health disparities; it focuses on (i) research, (ii) research infrastructure, and (iii) public information and community outreach. In the latter area, the plan emphasizes development of research-based information resources to increase public awareness—including efforts targeting both consumers and providers. The National Heart, Lung, and Blood Institute has its own strategic plan for the reduction of health disparities. The plan's goals include, among others, development and testing of interventions to improve health behaviors related to nutrition and weight loss; improving understanding of differences in care-seeking behavior, access, treatment delivery, and treatment adherence; testing interventions to reduce these differences; and promoting cultural competency among health care providers through education and training programs. The National Cancer Institute is working in several areas to reduce disparities; including the development of culturally and educationally appropriate cancer awareness campaigns, with an emphasis on low-literacy populations. All of these efforts seem to include some emphasis on adding to the knowledge base as well as a component of patient and/or provider education.

The IOM report divides interventions into two primary types--systemic strategies and cross-cultural education in the health professions. In addition, the report emphasizes the data collection, monitoring, and research that is needed to effectively address disparities. Systemic approaches are defined as "organizational accommodations that may promote equity in healthcare, policies that reduce administrative and linguistic barriers to care, and practices that enhance patients' knowledge of and roles as active participants in the care process." Some examples of such initiatives that apply to health care delivery settings include ensuring that staff have training in culturally and linguistically appropriate service delivery, making bilingual staff available or providing no-cost interpreter services, and making available easily-understandable patient educational materials. Other interventions emphasize strengthening the doctor-

patient relationship by linking individuals with primary care providers; setting specific standards for publicly funded plans and managed care organizations; and, legal and policy interventions that incorporate patient protections and civil rights enforcement.

Within health systems, one recommendation suggests that medical care allocation decisions be driven by evidence-based clinical guidelines that health systems develop to ensure consistency of care. Such system-wide interventions constrain the likelihood of differing levels of care quality. At the same time, if different population subgroups are not treated within the same health care systems, then this will have little or no effect. Ensuring that minority and low SES individuals have access to the same health plans and systems as other groups is necessary to achieving uniform quality. Another option is to structure payment systems to improve available services to minorities and to eliminate provider incentives that may lead to treatment disparities. One final type of systemic strategy relies on patient education and empowerment. This strategy requires effective and user-friendly educational tools that can be initiated by healthcare providers (books, pamphlets, in-person instruction, etc.), but also requires that patients are willing to learn and take advantage of these resources. A wide array of internet resources and on-line quality assessments fall under this general rubric.

There are also a large number of interventions that are being implemented by states, local health-related organizations, and health plans. Disease management initiatives are widespread in health plans and constitute a type of strategy for reducing health disparities. These initiatives generally work by targeting patients with a specific condition and providing health education. In many cases, patients are routinely contacted by case managers or care coordinators and often physicians are provided with treatment guidelines or systems of reminders for particular diagnostic or evaluative tests. The American Academy of Allergy, Asthma, and Immunology maintains an on-line allergy and asthma disease management center, with links to the most recent treatment guidelines and current literature. Columbia University oversees a similar website for management of heart disease; the website provides journal resources and other materials for providers but also has patient education materials available.

An interesting federal-local partnership is a CDC initiative, "Racial and Ethnic Approaches to Community Health (REACH 2010)." Funding has been provided to community coalitions for work targeting six health priority areas: infant mortality, improving breast and cervical cancer screening and management, cardiovascular disease, diabetes, improving child and/or immunization levels, and HIV/AIDS. While these priority areas emphasize chronic conditions and preventive care rather than acute care, they may still serve as models in terms of

the collaborations that have been developed. A few of the programs are described briefly here.

- The Promotora Lay Health Workers project in Chicago: intended to raise awareness and build skills to manage and control diabetes among Latinos through teaching decision-making and problem-solving skills and fostering social support.
- Diabetes Today: development of strategic plan that is community owned and culturally relevant to the local population, provides skill-building instruction to participants so that they can lead local communities.
- Hispanic Radio Network programs: programs about diabetes, aired in Spanish, in 41 US cities, 3-minute programs along with an 800 number and printed information available.
- Pharmacists Training Program: to train pharmacists practicing in communities with significant African American populations.
- Project DIRECT: community diabetes demonstration project in predominantly African American community in North Carolina, includes diabetes management and nutrition courses, organized walking programs, and screening.

In addition to the specific programs developed and funded under the REACH initiative, a large literature review was conducted to identify best practices in each of the six health priority areas. With respect to diabetes, for example, approximately 17 articles were identified describing the outcomes of diabetes-related community interventions for racial/ethnic populations. The studies emphasized patient education, self-care, and behavioral change, often using community health workers as liaisons. Several included weight loss and exercise programs. The review of cardiovascular disease interventions in ethnic communities stressed the usefulness of (i) needs assessments to develop carefully targeted interventions that help communities to achieve their main goals; (ii) training local health workers to conduct the interventions; and (iii) multi-modal strategies—for example, using written pamphlets, videos, *and* face-to-face contact. The review also concluded that methods requiring serious time commitments may not necessarily be more effective and that classes tend to have low attendance rates.

Efforts related to specific procedures appear to be less common. There are a number of quality reports that target differences across hospitals, such as the Maryland Hospital Performance Evaluation Guide which provides hospital-specific statistics on a range of different conditions/procedures. One more focused effort--concerning hysterectomy--was sponsored by the Women's Health Initiative of NIH and the CDC. The ENDOW study (Ethnicity, Needs, Decisions of Women) assessed attitudes of women from different ethnic groups through

focus groups and surveys and, based on the findings, developed a range of informational materials including videos and brochures. A large number of hospitals and other health care organizations (e.g., the Mayo Clinic) provide extensive consumer-oriented information about specific procedures in order to inform consumers about their options as well as to provide information on what to expect if they should undergo a specific procedure. These latter are somewhat more traditional—albeit more high-tech--patient-education approaches.

As can be seen from this brief overview, the range of approaches is quite extensive and varies considerably according to the targeted condition or health practice. Most of the initiatives focus either on increasing use of general preventive care or improving specific health behaviors or practices related to a chronic condition. This review provides information on possible interventions at a relatively broad level; a more effective approach may be to identify specific potential methods after narrowing the type of disparities involved.

Assessment of Approaches to Analyzing Health Disparities. The purpose of this project is to assess the feasibility of using administrative data to study health care disparities among Maryland residents. There is a large body of work examining differences in patterns of care across population subgroups, at the national and local levels. From the review of work that has been done related to health care disparities, it appears that the best of the studies are able to use detailed data--usually from medical records and/or physician or patient interviews--to control for the large number of confounding variables that affect the course of treatment and the outcomes following the treatment. Such variables include, among others, the severity of illness at diagnosis, the extent of co-morbidities, the physician's assessment and recommendations for treatment, and the patient's preferences for different types of care.

Despite the difficulties inherent in controlling for all of these influences, there have been a large number of studies that have successfully relied on administrative data. These studies, too, have contributed to the body of knowledge on health care disparities. While not as extensive as medical record data, hospital administrative data usually include a sufficient range of data items to characterize a patient's health status and the care received. Some of the data elements in the patient-level data available on the Maryland HSCRC hospital discharge data set are:

- Admission and discharge status
- Length of stay

- Patient demographics (e.g., age, gender, race/ethnicity, zip code[4])
- Principal and secondary diagnoses
- Principal and secondary procedures
- Total charges
- Expected source of payment

Although hospital characteristics are not on the file, data can be linked by hospital to the American Hospital Association or other hospital-level data to add information on hospital size, type, profit status, and so on. In addition, there are items that may be of interest for particular analyses (e.g., number of ICU days).

In general, these data can be used to examine patterns of health care treatment among population subgroups—groups categorized by race/ethnicity, gender, or geography. This type of administrative data can be useful in research that examines care within or across hospitals, or within market areas. Computer algorithms have been developed to better adjust for severity of conditions, alleviating some concern about confounding influences on treatment.

There are other limitations. Certain kinds of information can only be obtained from medical records—for example, the administration of a diagnostic laboratory test is usually not part of hospital discharge data and the test results are even less likely to be available. Thus, if one wanted to study the care received by a subset of patients with a given diagnosis where the subset is defined by a test result, medical records would be required. Similarly, patient preferences concerning one procedure vs. another could be an unmeasured variable that looks to the researcher like a disparity in care.

It is also difficult to obtain a good picture of socio-economic status using administrative data. Since no data are available that directly measure either income or education, these are usually proxied using characteristics of the patient's residential zip code (by linking to Census data and using median statistics) or by examining payer status. Either approach is inexact, at a minimum, but usually considered to be superior to having no information at all. As in any data set, there may also be limitations with respect to specific variables that are not readily apparent prior to using the data.[5] For example, while race/ethnicity information is collected and available on the data file, this type of data element may have a higher rate of 'missing' data than for other items.

In addition to hospital administrative data, other data sets that are available to describe the health care of Maryland residents include the Medical Care Data Base (MCDB), the HSCRC ED data system, and Vital Statistics mortality data

[4] Patient zipcode is not listed as a data element for Maryland on the Statewide Inpatient Data file, though we assume it is available on the HSCRC file.
[5] We are unable to comment on the quality of the data set, having not used this particular data set.

available in the state. The MCDB consists of outpatient claims from the vast majority of private payers in the state. For analysis of health care disparities, however, the MCDB is missing two important types of information. First, while variations in patterns of care have been examined for different subgroups, there is no race information with which to analyze racial disparities. Second, data are from private payers and, hence, there is no information on the care of the uninsured or persons enrolled in Medicaid.

The ED data, on the other hand, is potentially suitable for examining health care disparities. Two studies reported by the IOM dealt with differences in the use of emergency services; one assessed racial differences in denial of authorization for ED care by managed care gatekeepers and the other evaluated racial differences in ED use. While data on managed care authorizations may not be available, it is likely that the latter type of study could be conducted using the ED administrative data. Such a study could presumably be conducted with information on patient demographic characteristics, diagnoses and procedure codes, and visit disposition.

Differences in condition-specific mortality rates across population subgroups have been used to demonstrate disparities in health. In addition, many of the hospital performance indicators incorporate mortality information—either in the form of in-hospital mortality or 30-day post-admission mortality. While the former information would be available in the discharge data, in order to examine death outside the hospital, hospital records would need to be linked to mortality data. This type of linkage has certainly been done and is not inherently difficult though it may be subject to some error. Matching algorithms have been developed and usually rely on all or some combination of the following: name, date of birth, gender, Social Security number. Because of differences in spelling or inaccurate information, discharge records may be mistakenly matched to zero or multiple death records. Any linkage would probably be easier (and certainly less costly) if it were restricted to those records held in Maryland rather than attempting to use the National Death Index.[6] Possible obstacles to linking to mortality data include the level of resources required and the potential of requiring approval by an Institutional Review Board.

Recommendations related to Specific Measures

While there is an extensive literature on health care disparities, the approaches to studying disparities are quite varied and do not offer a clear guide to researchers: there is no apparent consensus on the 'best' conditions to study or a superior

[6] Since the focus of any analysis would be on Maryland residents, this would likely be the preferable approach. Any non-Maryland residents in the discharge data set would be excluded from the analysis at the outset.

approach for selecting study conditions. When focusing on the subset of the literature that relies on administrative data, there seem to be two general approaches—the first being a more broad brush strategy that looks at multiple and varied conditions/procedures and the second being a more focused study of one (or a few) specific condition(s).

Within the framework of the former approach, some of these studies have looked at rates of specific procedures with no prior control for diagnosis or have looked at the receipt of *any* procedure within a diagnostic category. With these analyses, there is some difficulty in assessing whether use in one group is too low or whether use in the referent group is too high; in other words, there is often no measure of appropriateness. Similarly, with broad categories of procedures it may be quite difficult to appropriately adjust for risk. Moreover, one gets little sense of the underlying mechanisms at work in causing the disparities; in other words there is no clear picture of why differences occur for some conditions and not for others and the factors that may be associated with these differences. On the other hand, large and consistent differences across population subgroups indicate, at a minimum, an area worthy of further investigation and this strategy can be effectively used to focus further research on those conditions or procedures for which disparities are initially found.

An alternative approach and the strategy that we are recommending is for MHCC to begin with existing quality indicators and examine whether there are differences in these measures across population groups of interest. For example, if we start with CONQUEST quality measures, restrict indicators to those that use inpatient administrative data, and then further restrict indicators to non-cardiac conditions, over 40 unique measures would be available for analysis. Tables A2 and A3 list single procedure indicators and condition-specific measures, respectively, that meet these initial criteria.

We have also included other information relevant to the indicators. To begin with, we have looked at the prevalence of the conditions represented by each measure in the Maryland inpatient population. AHRQ has published data on the top 100 ranked procedures in U.S. Community Hospitals, the percentage of discharges represented by these conditions and the inpatient mortality rates associated with these conditions. Applying these figures to the number of total discharges in the Maryland inpatient database provides a rough idea of the sample sizes for such analyses.[7] In addition to prevalence, the potential impact on cost might be a consideration in selecting conditions for study. Median charges for the US as a whole are also provided.

[7] These estimates are somewhat rough; more accurate counts could be made directly from the inpatient data base. At this time, we have not been able to make estimates of sample sizes for indicators in Table A4.

In Tables A4 and A5, we have applied the general criteria laid out earlier to highlight those measures that may be most promising for study. Table A5 lists broad, multiple procedure indicators.[8] For each measure, we have multiplied the estimated annual number of Maryland discharges by the estimated median charge. The conditions have been listed from highest to lowest estimated total cost. In the final column of the table, we have grouped these as 'most promising,' 'promising,' and 'least promising.' These characterizations are based on the overall cost along with other considerations related to the measure such as previous work that has been done.

Several of the measures fall out through this process; in particular, estimated in-hospital mortality rates for several of the procedures yield too few cases for analysis. In general in selecting conditions or procedures, overall sample sizes and sample sizes for the subgroups of analytic interest need to be adequate to allow detection of differences or to be able to say with confidence that there are no differences. One possible solution to insufficient sample sizes would be to combine multiple years of data.

Many of these conditions/procedures have been examined and differences have been found for some of them with respect to race or geography. For example, a reduction in Cesarean births from 18 to 15 percent of live births[9] is an objective of the federal government's Healthy People 2010 initiative. Information from the National Vital Statistics System at the CDC shows that current rates of C-section births vary somewhat by race/ethnicity, with C-sections representing 21 percent of live births for African American women compared to 18 percent for whites.

Another procedure that is substantial in terms of health care dollars is hysterectomy—there are approximately 600,000 hysterectomies performed each year in the US at an estimated annual cost of over $5 billion.[10] Rates vary by geographic region (with substantially higher rates in the South). Nationally, rates have not been found to vary by race, though a 1993 study found that African-American women in Maryland were 25 percent more likely to have a hysterectomy than were white women of the same age.[11]

As part of the Dartmouth Atlas Project, a number of procedures have been studied, many at the local level. A Community Profile Report for Maryland and the District of Columbia shows rates of transurethral prostatectomy (TURP) for benign prostate hyperplasia (BPH) that vary substantially across hospital referral

[8] Limited published information was available on these indicators.
[9] For women giving birth for the first time.
[10] CDC's Reproductive Health Information Source. http://www.cdc.gov.nccdphp/drh/wh_hysterec.htm
[11] Kjerulff K, Guzinski G, Langenberg P, et al. Hysterectomy and race. *Obstet Gynecol* 82(5):757-764, 1993.

regions within the state. In the Baltimore hospital referral region, TURP rates were roughly in the 80th percentile[12] compared to the Takoma Park and Salisbury HRRs where the rates were around the 40th percentile.

Rates of laparoscopic cholecystectomy are also fairly high in terms of estimated cost. There has been some preliminary work done related to variation in rates across groups and an algorithm for risk adjustment specific to the procedure has been developed and tested.[13] Other indicators that may be promising include rates of laminectomy, low-birthweight births, and obstetrical complication rates.

With respect to examining re-admission rates for specific conditions, we assume that the hospital discharge data allow tracking multiple admissions of individuals within the same hospital, though not across hospitals; without the ability to track admissions across hospitals, some level of information would be lost though it may not cause serious bias. Analysis of re-admission rates is also somewhat limited because of annual files that censor events that happen before or after the specific time period over which a person can be tracked. Furthermore because not all of the measures obtained from the CONQUEST database identify appropriate risk adjusters, a strategy for adjusting for patient severity or co-morbidities might have to be developed in order to study disparities.

Those indicators identified in Table A3 as 'most promising' or 'promising' appear to be good candidates for study. Focusing on a small number of these indicators may allow for deeper understanding of mechanisms underlying any disparities found; internal analysis of covariates other than the one of particular interest (i.e., other than race, gender, or region) will provide additional information with which to assess the robustness of any findings. Focusing on a small number of indicators may also provide greater opportunity to design and implement feasible interventions in response to what is found.

[12] Compared to the national distribution of rates.
[13] Unpublished work by Stephen Parente.

APPENDIX TABLES

Table A.1
Literature Review

Condition	Population	Indicators	Data elements required	Reference
CANCER				
Benign ovarian tumors Cancer of cervix uteri Endometrial carcinoma	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	1. Patient demographics (age, gender, race/ethnicity) 2. Expected source of payment 3. Diagnosis (DRG) 4. Procedures (major therapeutic) 5. Resource measures (length of hospitalization and total charges) 6. Hospital-level characteristics (control/ ownership, teaching status, urban/rural location, and total bed size) 7. Zip code-level US Census Bureau data for populations by ethnicity	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Benign ovarian tumors Cancer of cervix uteri Endometrial carcinoma	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	1. Patient demographics (age, gender, race) 2. Expected source of payment 3. Diagnosis 4. Procedures (major therapeutic, major diagnostic and/or minor either) 5. Resource measures (length of hospitalization and total charges) 6. Hospital-level characteristics (control/ ownership, teaching status, urban/rural location, and total bed size)	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Breast cancer	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Breast cancer	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Breast cancer	Incident cases of breast carcinoma in Florida	Mortality Surgery after diagnosis of local or regional disease Radiation after surgery	1. Incident cases of breast cancer 2. Patient characteristics (insurance, SES, age, sex, race, marital status, smoking status, urban/rural) 3. Comorbidities 4. Diagnosis 5. Procedures performed (inpatient and outpatient – all treatments given within four months after initiation of therapy) 6. Stage of cancer (SEER) at diagnosis 7. Vital status/length of time from diagnosis to death	Roetzheim, et al. JACS 2000
Cancer of bladder Cancer of the kidneys	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Cancer of bladder Cancer of the kidneys	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
Cancer of lungs, bronchi or medimediastinum	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Cancer of lungs, bronchi or medimediastinum	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Cancer of the distal esophagus and gastric cardia	Males given a new diagnosis of cancer of the distal esophagus or gastric cardia at a VAMC (nationwide)	Survival Receipt of treatment: surgery, radiation, or chemotherapy	1. Diagnoses (ICD-9) 2. OR and non-OR procedures (6 months before index hospitalization and up to 1 year after) 3. Patient characteristics (race, sex, age, insurance, marital status) 4. Outpatient clinic visits and procedures (CPT) (6 months before index hospitalization and up to 1 year after) 5. Mortality status/date of death/survival time from diagnosis and from treatment 6. Comorbidities 7. Metastases (ICD-9)	Dominitz, et al. Medical Care 2002
Cancer of the pancreas	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Cancer of the pancreas	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Carcinoma of prostate	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Carcinoma of prostate	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Carcinoma of prostate, early-stage	Part A Medicare enrollees	Receipt of radical prostatectomy	1. Number of Medicare enrollees 2. Hospital referral regions 3. Rate of procedure use	The Dartmouth Atlas of Health Care 1999
Colorectal cancer	HCUP discharges with diagnosis denoting malignant neoplasms of the colon and rectum	Mortality (inpatient) Treatment - resource use - outcome - procedure type	1. Patient demographics (age, sex, race) 2. Primary expected payer/insurance 3. Vital status 4. Diagnosis, oncologic sequelae, and other complications (ICD-9) 5. Procedures 6. Comorbidities 7. Resource use (LOS and total charges) 8. Hospital characteristics (geographic regions, bedsize, teaching status, ownership, MSA, % of staff physicians certified, casemix) 9. Metastases (ICD-9)	Ball and Elixhauser Medical Care 1996

Condition	Population	Indicators	Data elements required	Reference
Colorectal cancer	Males given a new diagnosis of colorectal carcinoma at a VAMC (nationwide; who also do not have ulcerative colitis or Crohn's disease)	Mortality/survival (after diagnosis: general, not inpatient) Receipt of treatment: surgery, radiation, or chemotherapy	1. Patient demographics (sex, race, age, marital status, geographic location, insurance) 2. Diagnosis (ICD-9) 3. Procedures performed inpatient, outpatient, and during 5 years from base admission (CPT codes) 4. Tumor location 5. Metastases (ICD-9) 6. Comorbidities 7. Vital status/suvival time during 5 years from base admission	Dominitz, et al. JACS 1998
Colorectal cancer	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Colorectal cancer	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Colorectal cancer	All incident cases of colorectal cancer in Florida	Mortality/survival Receipt of treatements: surgery, radiation, or chemotherapy	1. Patient demographics (sex, race, SES, age, marital status, smoking status, insurance coverage) 2. Incident cases of colorectal cancer 3. Diagnosis (ICD-9) 4. Procedures performed (CPT codes) 5. Stage of cancer (SEER) 6. Comorbidities 7. Vital status/survival time from diagnosis and from treatment	Roetzheim, et al. AJPH 2000

Condition	Population	Indicators	Data elements required	Reference
Colorectal cancer	Part A Medicare enrollees	Receipt of colectomy	see Dartmouth Atlas 1999	The Dartmouth Atlas of Health Care 1999
Malignant neoplasm: lymphatic and hemapoietic tissue	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Malignant neoplasm: lymphatic and hemapoietic tissue	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Metastatic malignancies Neoplasia	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Metastatic malignancies Neoplasia	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
CARDIOVASCULAR				
AMI Heart failure	FFS Medicare enrollees with primary diagnosis of stroke or atrial fibrillation	AMI: • administration of aspirin and/or Beta-blocker within 24 hours of admission • aspirin and/or Beta-blocker prescribed at discharge • smoking cessation counseling given during hospitalization • time to angioplasty, min • time to thrombolytic therapy, min Heart failure: • evaluation of left ventricular ejection fraction Both: • ACE inhibitor prescribed at discharge (patients with <40% left ventricular ejection fraction)	1. Patient characteristics (age, race, sex) 2. Diagnosis 3. Data for performance measures (procedures/prescriptions given, etc.) 4. State/region	Jencks, et al. JAMA 2000

Condition	Population	Indicators	Data elements required	Reference
Angina CHF	Patients admitted to one of 147 VA hospitals with primary diagnosis of angina or CHF	Mortality	1. Diagnosis 2. Patient characteristics (age, sex, race, marital status, insurance, financial status) 3. LOS 4. Vital status/mortality at discharge, 30-day, and 6-month 5. Comorbidities 6. Hospital characteristics (bedsize, annual volume, proportion of black patients, research budget, number of resident trainees, technological capability, urban/rural, geographic region)	Jha, et al. JAMA 2001
CAD Arrhytmias and conduction disorders Diseases of the aortic valve	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Aneurysm, abdominal thrombophlebitis Tibial, iliac, femoral or popliteal artery disease	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Aneurysm, abdominal thrombophlebitis Tibial, iliac, femoral or popliteal artery disease Thrombophlebitis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Essential hypertension	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Essential hypertension	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
N/A	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of the following procedures: • coronary angiogram • coronary angioplasty • coronary bypass surgery • radionuclide stress test • exercise stress test • Swan-Ganz catheterization • permanent pacemaker • doppler echocardiogram • echocardiogram • EKG	1. Patient demographics (age, sex, race) 2. Date of Medicare eligibility 3. Health Maintenance Organization enrollment status 4. Date of death (if any) of each enrollee in the Part B Beneficiary sample 5. Residence (urban/rural)	Escarce, J.J., et al.. American Journal of Public Health, 1993.

Condition	Population	Indicators	Data elements required	Reference
N/A	non-HMO Medicare enrollees age 65 or older	Receipt of the following: angioplasty coronary-artery bypass surgery Discharges after hospitalization for ischemic heart disease	1. Patient demographics (age, sex, race, ZIP Code of residence, and date of death, income data) 2. Mortality rates (number of deaths per year) 3. Number of physician visits (per beneficiary per year) 4. Number of hospital discharges per year 5. Discharges (all diagnoses) 6. Inpatient procedures	Gornick, M.E., et al., New England Journal of Medicine, 1996.
N/A	All Medicare beneficiaries 65 and older (non-HMO)	Total annual hospital discharges Total annual surgical DRG discharges 30 day post-admission mortality rate Receipt of the following: • arteriovenostomy • cardiac catheterization • PTCA • CABG • carotid endarterectomy	1. Patient demographics (sex, race, age) 2. Dates of admission and discharge 3. Diagnosis (DRG and ICD-9-CM) 4. Procedures and rates of utilization 5. Date of death, if any 6. 30-day post admission death rate	McBean, A.M. and Gornick, M., Health Care Financing Review, 1994.
CEREBROVASCULAR/NEUROLOGICAL				
Epilepsy, convulsion	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Epilepsy, convulsion	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Stroke	Sample of Medicare patients hospitalized for stroke in one of five states	Utilization of inpatient rehabilitation services - use of PT/OT services - time to initiation of therapy - amount/extent of therapy	1. Patient characteristics (age, race, sex, insurance, lived in nursing home or home before admission) 2. Procces of care (RAND index, DNR orders present, LOS) 3. Use of PT/OT services (date of initiation, number of days received) 4. Status at discharge 5. Discharge destination 6. Stroke characteristics (type, level of consciousness on admission, ED admission or not, presence of motor deficit at admission, history of prior stroke, ability to walk before admission) 7. Comorbidities 8. Hospital characteristics (rural/urban, teaching status, ownership, bedsize, geographic region)	Horner, et al. Stroke 1997

Condition	Population	Indicators	Data elements required	Reference
Stroke	FFS Medicare enrollees with primary diagnosis of stroke or atrial fibrillation	- warfarin prescribed for patients with atrial fibrillation - antithrombolitic prescribed as discharge for patients with acute stroke or TIA - avoidance of sublingual nifedipine for patient with acute stroke	see Jencks, 2000	Jencks, et al. JAMA 2000
Stroke (prevention); stenosis or arthrosclerosis	Part A Medicare enrollees	Receipt of endarterectomy	1. Number of Medicare enrollees 2. Hospital referral regions 3. Rate of procedure use 4. U.S. national average rate of procedure use among Medicare enrollees	The Dartmouth Atlas of Health Care 1999

Condition	Population	Indicators	Data elements required	Reference
GASTROINTESTINAL				
Anorectal suppuration Crohn's disease Diverticular disease Functional digestive disorders Peptic ulcer Vascular insufficiency of the bowels	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Anorectal suppuration Crohn's disease Diverticular disease Functional digestive disorders Peptic ulcer Vascular insufficiency of the bowels	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Hernia, external Hiatal hernia/ reflux esophagitis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Hernia, external Hiatal hernia/ reflux esophagitis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
N/A	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of the following procedures: • flexible sigmoidoscopy • rigid proctosigmoidoscopy • colonoscopy • barium enema • upper gastrointestinal endoscopy • upper gastrointestinal series	see Escarce 1993	Escarce, J.J., et al.. American Journal of Public Health, 1993.
GYNECOLOGICAL				
Dysfunctional uterine bleeding PID	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Dysfunctional uterine bleeding PID	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
N/A	All Medicare beneficiaries 65 and older (non-HMO)	Total annual hospital discharges Total annual surgical DRG discharges 30 day post-admission mortality rate Receipt of hysterectomy	see McBean 1994	McBean, A.M. and Gornick, M., Health Care Financing Review, 1994.
OPHTHALMOLOGIC				
N/A	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of the following procedures: • cataract extraction with lens insertion • laser trabeculopasty • glaucoma surgery • retinal photocoagulation	see Escarce 1993	Escarce, J.J., et al.. American Journal of Public Health, 1993.
ORTHOPAEDIC/MUSKULOSKELETAL				
Ankle injury Ligamentous injury knee Bursitis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Ankle injury Ligamentous injury knee Bursitis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
Facture, hip	Part A Medicare enrollees	Receipt of surgical hip fracture repair	see Dartmouth Atlas 1999	The Dartmouth Atlas of Health Care 1999
Fracture of femur Fracture of tibia Fracture, dislocation or sprain of facial bones Fracture, dislocation or sprain of shoulder or head of humerus	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Fracture of femur Fracture of tibia Fracture, dislocation or sprain of facial bones Fracture, dislocation or sprain of shoulder or head of humerus	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Fracture, dislocation or sprain of hip/pelvis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Fracture, dislocation or sprain of hip/pelvis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
Herniated intervertebral disc	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Herniated disc or spinal stenosis	Part A Medicare enrollees	Receipt of back surgery	see Dartmouth Atlas, 1999	The Dartmouth Atlas of Health Care 1999
Herniated intervertebral disc	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Isolated long-bone fractures	Hispanic and non-Hispanic white patients admitted to the UCLA Emergency Medicine Center , aged 15-55, with an ED discharge diagnosis of isolated long-bone fracture (with other exclusions)	Receipt of analgesia in ED	1. Patient characteristics (race/hispanic ethnicity, age, sex, insurance status, principal language, means and time of arrival to ED) 2. Diagnosis (ICD-9) 3. Patient intoxication or altered mental status 4. Time of injury (length before admission) 5. Analgesic administration (use, type, dosage) 6. Injury characteristics (mechanism, specific bone, presence of open fractures, need for reduction, time to x-ray, total time in ED, admission or transfer) 7. Physician characteristics (ethnicity, sex, ED/EM specialty)	Todd, et al. JAMA 1993

Condition	Population	Indicators	Data elements required	Reference
Osteoarthritis Osteomyelitis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Osteoarthritis Osteomyelitis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Oteoarthritis of the hip	Part A Medicare enrollees	Receipt of hip replacement	see Dartmouth Atlas, 1999	The Dartmouth Atlas of Health Care 1999
Trauma to spinal cord – lumbosacral or cervical Head injury Trauma to chest wall or breast	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Trauma to spinal cord – lumbosacral/ cervical Head injury Trauma to chest wall or breast	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Unknown	All Medicare beneficiaries 65 and older (non-HMO)	Total annual hospital discharges Total annual surgical DRG discharges 30 day post-admission mortality rate Receipt of the following procedures: • Reduction of fracture of femur • Other arthroplasty of hip • Total knee replacement • Total hip replacement • Laminectomy • Excision of disc • Spinal fusion	see McBean 1994	McBean, A.M. and Gornick, M., Health Care Financing Review, 1994.
Unknown	non-HMO Medicare enrollees age 65 or older	Receipt of hip-fracture repair	see Gornick 1996	Gornick, M.E., et al., New England Journal of Medicine, 1996.
Unknown	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of total knee replacement Receipt of total hip replacement	see Escarce 1993	Escarce, J.J., et al.. American Journal of Public Health, 1993.

Condition	Population	Indicators	Data elements required	Reference
PULMONARY/RESPIRATORY				
COPD	Patients admitted to one of 147 VA hospitals with primary diagnosis of COPD	Mortality	see Jha 2001	Jha, et al. JAMA 2001
Pleurisy	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Pleurisy	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Pneumonia	FFS Medicare enrollees with primary diagnosis of pneumonia	- antibiotic within 8 hours of arrival at hospital - antibiotic consistent with current recommendation - blood culture drawn (if done) before antibiotic given - patient screened for or given influenza vaccine - patient screened for or given pneumococcal vaccine	see Jencks 2000	Jencks, et al. JAMA 2000

Condition	Population	Indicators	Data elements required	Reference
Pneumonia	Patients admitted to one of 147 VA hospitals with primary diagnosis of pneumonia	Mortality	see Jha 2001	Jha, et al. JAMA 2001
Pulmonary embolism	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Pulmonary embolism	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
SURGICAL/GENERAL INTERNAL				
Cholecystitis and/or cholelithiasis (gall bladder)	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Cholecystitis and/or cholelithiasis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Cholecystitis, chronic	Part A Medicare enrollees	Receipt of cholecystectomy	see Dartmouth Atlas, 1999	The Dartmouth Atlas of Health Care 1999
Cirrhosis of liver	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.

Condition	Population	Indicators	Data elements required	Reference
Cirrhosis of liver	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Diabetes	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Diabetes	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Diabetes	Patients admitted to one of 147 VA hospitals with primary diagnosis of diabetes mellitus	Mortality	see Jha 2001	Jha, et al. JAMA 2001
Pancreatitis	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Pancreatitis	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
Unknown	All Medicare beneficiaries 65 and older (non-HMO)	Total annual hospital discharges Total annual surgical DRG discharges 30 day post-admission mortality rate Receipt of the following procedures: • Prostatectomy • Open cholecystectomy • Repair of inguinal hernia • Mastectomy • Appendectomy • Amputation of part of lower limb • Bilateral orchiectomy	see McBean 1994	McBean, A.M. and Gornick, M., Health Care Financing Review, 1994.
N/A	non-HMO Medicare enrollees age 65 or older	Receipt of the following procedures: • amputation of all or part of lower limb • bilateral orchiectomy	see Gornick 1996	Gornick, M.E., et al., New England Journal of Medicine, 1996.

Condition	Population	Indicators	Data elements required	Reference
N/A	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of the following procedures: • cholecystectomy • inguinal hernia repair • transurethral prostatectomy	see Escarce 1993	Escarce, J.J., et al.. American Journal of Public Health, 1993.
UROLOGIC/RENAL				
Bladder disorders Calculus of urinary tract	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Bladder disorders Calculus of urinary tract	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Renal failure, acute Kidney dialysis and transplant	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Renal failure, acute Kidney dialysis and transplant	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
Renal failure, chronic	Patients admitted to one of 147 VA hospitals with primary diagnosis of chronic renal failure	Mortality	see Jha 2001	Jha, et al. JAMA 2001

Condition	Population	Indicators	Data elements required	Reference
SCREENING/IMAGING				
N/A	non-HMO Medicare enrollees age 65 or over from a 5% random sample of all Medicare enrollees (Part B)	Receipt of the following: • mammogram • MRI scan • CATscan • chest radiograph	see Escarce 1993	Escarce, J.J., et al.. American Journal of Public Health, 1993.
N/A	non-HMO Medicare enrollees age 65 or older	Receipt mammography	see Gornick 1996	Gornick, M.E., et al., New England Journal of Medicine, 1996.
MISCELLANEOUS				
Cellulitis Chronic skin ulcerations, except decubitis Complications of incisions	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Cellulitis of upper/ lower extremity Chronic skin ulcerations, except decubitis Complications of incisions	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.

Condition	Population	Indicators	Data elements required	Reference
ICU therapy	Patients admitted to ICUs in a sample of 40 non-federal, >200 bed hospitals (excluded patients: CABG, LOS in ICU <4 hours, <16 years of age, burn injuries, chest pain)	Risk-adjusted predicted hospital mortality rate LOS resources use	1. Hospital characteristics (bedsize, region, teaching status, ICU admission rate) 2. LOS in ICU 3. Diagnoses/reason for admission 4. Patient characteristics (age, sex, race, insurance) 5. Comorbidities 6. Patient functional status 7. Procedures and lab tests performed 8. Survival rate at ICU discharge and hospital discharge	Williams, et al. Critical Care Medicine 1995
Labor&delivery	Singleton first live births in California	Cesarean delivery	1. Patient demographics (insurance, race, age, education, marital status) 2. Community characteristics (% poverty, % non-English speakers) 3. Hospital characteristics (delivery volume, ownership, region, teaching status) 4. Prenatal care initiation (time into pregnancy) 5. Medical risk factors (birthweight, mechanical factors, fetal stress, misc. complications) 6. Delivery mode (vaginal or cesarean)	Braveman, et al AJPH 1995

Condition	Population	Indicators	Data elements required	Reference
Open wound/ blunt wound of lower extremity Open wound/ blunt wound of upper extremity Open wound/ blunt wound to abdomen or trunk	HCUP/SID adult inpatient discharges for California, Florida, and New York	Receipt of major therapeutic procedures	see Andrews, et al. 2000	Andrews, R.M. and Elixhauser, A., Ethnicity & Disease, 2000.
Open wound/ blunt wound of lower extremity Open wound/ blunt wound of upper extremity Open wound/ blunt wound to abdomen or trunk	HCUP adult inpatient discharges	Receipt of procedures to correct the conditions	see Harris, et al. 1997	Harris, D.R., Andrews, R., and Elixhauser, A., Ethnicity & Disease, 1997.
N/A	All Medicare beneficiaries 65 and older (non-HMO)	Total annual hospital discharges Total annual surgical DRG discharges 30 day post-admission mortality rate Receipt of excisional debridement	see McBean 1994	McBean, A.M. and Gornick, M., Health Care Financing Review, 1994.

Table A.2
Single Procedure Indicators from CONQUEST Database that may be Derived with Administrative Data

Set Name	Measure Name	Procedures as % of all discharges in U.S.†	Estimated number of Maryland Discharges for Procedure*	In-hospital mortality (%)†	Estimated Number of Procedure-Related Deaths in Maryland Discharge Data	Charges (U.S. median)†
HCUP-3	Laminectomy /spinal fusion rates	laminectomy = 0.98 Spinal fusion = 0.28	Laminectomy = 6,144 Spinal Fusion = 1,755	N/A	N/A	Lam. = $8,692 SF = $17,284
HCUP-3	In-hospital mortality following laminectomy/spinal fusion;	laminectomy = 0.98 Spinal fusion = 0.28	Laminectomy = 6,144 Spinal Fusion = 1,755	Laminectomy =0.16 Spinal fusion = 0.38	Laminectomy = 10 Spinal Fusion = 7	Lam. = $8,692 SF = $17,284
HCUP-3	Laparoscopic Cholecystectomy rates	1.17 (rate is for all cholecystectomies)	7,335	N/A	N/A	$10,719
HCUP-3	In-hospital morality following cholecystectomy	1.17 (rate is for all cholecystectomies)	7,335	0.87	64	$10,719
HCUP-3	In-hospital mortality following hip replacement	0.84	5,266	1.45	76	$18,951
HCUP-3	In-hospital mortality following knee replacement	0.91	5,705	0.36	21	$18,077
HCUP-3	Hysterectomy rates	1.82	11,410	N/A	N/A	$7,909

Set Name	Measure Name	Procedures as % of all discharges in U.S.	Estimated number of Maryland Discharges for Procedure*	In-hospital mortality (%)	Estimated Number of Procedure-Related Deaths in Maryland Discharge Data	Charges (median)
HCUP-3	In-hospital mortality following hysterectomy	1.82	11,410	0.09	10	$7,909
HCUP-3	TURP rates	0.45	2,821	N/A	N/A	$6,239
HCUP-3	In-hospital mortality following TURP	0.45	2,821	0.30	8	$6,239
HCUP-3	Cesarean section delivery	2.27	14,231	N/A	N/A	$6,594
HCUP-3	Incidental appendectomy among the elderly	0.66 (appendectomy rate for all populations)	4,138	N/A	N/A	$7,370 (all populations)
HCUP-3	Rates of radical prostatectomy	0.20 (open prostatectomy rate)	1,254	N/A	N/A	$11,987

* Based on an estimated 626,955 annual discharges, as contained in the 1999 HCUP State Inpatient Database
† Rates as reported in *Most Common Diagnoses and Procedures in U.S., Community Hospitals, 1996*, AHCPR Pub. No. 99-0046, September 1999.

Table A.3
Condition-Specific Measures from CONQUEST Database that may be Derived with Administrative Data

Set Name	Measure Name	Condition as % of all discharges in U.S. †	Estimated number of Maryland Discharges*	Charges (U.S. median) †
HCUP –3	Obstetrical complication rates	6.63 (rate reflects proportion of live births)	4,564	$3,597
HCUP-3	Low-birthweight births	7.60‡ (rate reflects proportion of live births)	5,232	$9,498 (reflects charges for liveborn with respiratory intubation or mechanical ventilation)
VA	COPD readmission rates	19.0± (rate reflects 30-day readmissions for selected chronic conditions, including COPD)	1,870	$6868
VA	Diabetes readmission rates	19.0± (rate reflects 30-day readmissions for selected chronic conditions, including diabetes)	1,381	$6,095
VA	Pulmonary disease readmission	19.0± (rate reflects 30-day readmissions for selected chronic conditions)	Pleurisy & pnemo. = 345 Acute bronchitis = 691 Asthma = 1,429	Pleurisy & pnemothorax = $8,270 Acute bronchitis = $4,127 Asthma = $4,350

* Based on an estimated 626,955 annual discharges, as contained in the 1999 HCUP State Inpatient Database
† Rates as reported in *Most Common Diagnoses and Procedures in U.S., Community Hospitals, 1996*, AHCPR Pub. No. 99-0046, September 1999.
‡ Healthy People 2010, www.health.gov/healthypeople/Document/HTML/Volume2/16MICH.htm.
± Weinberger M, Oddone EZ, Henderson WG. "Does Increased Access to Primary Care Reduce Hospital Readmissions?" New England Journal of Medicine 1996; 334:1441-1447.

Table A.4
Single Procedure or Condition-Related Indicators from the CONQUEST Database that may be Derived with Administrative Data: Estimates of Statewide Inpatient Charges (1996) Potentially Associated with Condition/Procedure and Recommendations for Inclusion in a Study of Health Care Disparities.

Set Name	Measure Name	Estimated Charges Associated with Condition/Procedure for Maryland Population (in millions)*	Recommendation for Inclusion in Maryland Disparities Study (++) Most Promising (+) Promising (-) Least Promising
HCUP-3	Cesarean section delivery	93.8	(++) Significance of condition in terms of persons and costs are very high. Rates have been found to differ by race and ethnicity. Rates are population-based and could reflect underlying differences in risk factors.
HCUP-3	Hysterectomy rates	90.2	(++) Significance of condition in terms of persons and costs are very high. Rates have been found to vary geographically and by race. However, rates are population-based and could reflect underlying differences in the prevalence of conditions for which treatment with hysterectomy is used
HCUP-3	Laminectomy /spinal fusion rates	83.7	(++) Significance of condition in terms of persons and costs are very high. Rates are population-based and could reflect underlying differences in the prevalence of conditions for which treatment with laminectomy or spinal fusion is used.
HCUP-3	Laparoscopic Cholecystectomy rates	78.6	(++) Significance of condition in terms of persons and costs are very high. However, rates are population-based and could reflect underlying differences in the prevalence of conditions for which treatment with cholecystectomy is used.
HCUP-3	Low-birthweight births	49.7	(++) Significance of condition in terms of persons and costs are very high. Rates have been found to differ by race and ethnicity. Rates are population-based and could reflect underlying differences in risk factors.

Set Name	Measure Name	Estimated Charges Associated with Condition/Procedure for Maryland Population (in millions)*	**Recommendation for Inclusion in Maryland Disparities Study** (++) Most Promising (+) Promising (-) Least Promising
HCUP-3	Incidental appendectomy among the elderly	30.5 (includes all populations and all appendectomies)	**(+)** Significance of condition in terms of persons and costs are moderate. Rates are population-based and could reflect underlying differences in the prevalence of conditions for which intra-abdominal procedures are required.
HCUP-3	TURP rates	17.6	**(+)** Significance of condition in terms of persons and costs are moderate. Rates have been found to vary geographically. Rates are population-based and could reflect underlying differences in the prevalence of conditions for which treatment with TURP.
HCUP –3	Obstetrical complication rates	16.4	**(++)** Significance of condition in terms of persons and costs are moderate. Rates reflect quality of inpatient services received.
HCUP-3	Rates of radical prostatectomy	15.0 (includes open prostatectomy)	**(+)** Significance of condition in terms of persons and costs are moderate. Rates are population-based and could reflect underlying differences in the prevalence of conditions for radical prostatectomy is used.
VA	COPD readmission rates	12.8	**(+)** Significance of condition in terms of persons and costs is moderate. Rates reflect quality of inpatient services received.
VA	Diabetes readmission rates	8.4	**(+)** Significance of condition in terms of persons and costs is moderate. Rates reflect quality of inpatient services received.
VA	Pulmonary disease readmission	11.9	**(+)** Significance of conditions in terms of persons and costs is moderate. Rates reflect quality of inpatient services received.

Set Name	Measure Name	Estimated Charges Associated with Condition/Procedure for Maryland Population (in millions)*	**Recommendation for Inclusion in Maryland Disparities Study** (++) Most Promising (+) Promising (-) Least Promising
HCUP-3	In-hospital mortality following hip replacement	1.44	**(-)** In-hospital mortality rates yield too few cases for analysis.
HCUP-3	In-hospital morality following cholecystectomy	0.69	**(-)** In-hospital mortality rates yield too few cases for analysis.
HCUP-3	In-hospital mortality following knee replacement	0.38	**(-)** In-hospital mortality rates yield too few cases for analysis.
HCUP-3	In-hospital mortality following hysterectomy	0.08	**(-)** In-hospital mortality rates yield too few cases for analysis.
HCUP-3	In-hospital mortality following laminectomy/spinal fusion;	0.07	**(-)** In-hospital mortality rates yield too few cases for analysis.
HCUP-3	In-hospital mortality following TURP	0.05	**(-)** In-hospital mortality rates yield too few cases for analysis.

* Figures represent estimated number of Maryland discharges for the condition or procedure by the median inpatient charge; discharge rates charges are as reported in *Most Common Diagnoses and Procedures in U.S., Community Hospitals, 1996*, AHCPR Pub. No. 99-0046, September 1999, unless otherwise specified in Table A.3.

Table A.5
Broad / Multiple Procedure Indicators from the CONQUEST Database that may be Derived with Administrative Data: Estimates of Incidence (1996) and Recommendations for Inclusion in a Study of Health Care Disparities.

Set Name	Measure Name	Incidence Rate*	Estimated number of Maryland Discharges with Condition	Recommendation for Inclusion in Maryland Disparities Study (++) Most Promising (+) Promising (-) Least Promising
HCUP –3	Pneumonia after major surgery/invasive vascular procedures	2.68	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not apparent.
HCUP –3	Urinary tract infections after major surgery	3.95	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not apparent.
HCUP –3	Venous thrombosis or pulmonary embolism after major surgery/invasive vascular procedures	0.53	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.

Set Name	Measure Name	Incidence Rate*	Estimated number of Maryland Discharges with Condition	Recommendation for Inclusion in Maryland Disparities Study (++) Most Promising (+) Promising (-) Least Promising
HCUP –3	Pulmonary compromise after major surgery	1.68	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.
HCUP –3	Gastrointestinal hemorrhage or ulceration after major surgery	0.39	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.
HCUP –3	Wound infection rates	0.32	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.
HCUP –3	Adverse or iatrogenic complications	3.40	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.
JCAHO	Post-operative CNS complications	Not Found	Not Found	Cannot be determined

Set Name	Measure Name	Incidence Rate*	Estimated number of Maryland Discharges with Condition	Recommendation for Inclusion in Maryland Disparities Study (++) Most Promising (+) Promising (-) Least Promising
JCAHO	Post-operative peripheral neurological deficits	Not Found	Not Found	Cannot be determined
JCAHO	Post-operative hospital mortality	0.35 (peri-operative rate)	Not Found	(-) Information on significance of condition in Maryland population is not available. Indicator does not control for differences in case-mix, and data to control for patient severity is unavailable. Indicator reflects quality of care provided by hospital and interventions to reduce disparities are not readily apparent.
Maryland Hospital Association	Inpatient mortality rate	2.69	16,865	(+) Significance of condition in terms of lost lives is assumed to be high. Data to control for patient severity is unavailable.
Maryland Hospital Association	Neonatal mortality rate	0.07 – 24.9 (rate varies by birth weight	Number varies by birthweight	(+) Significance of condition in terms of lost lives is assumed to be high.
Maryland Hospital Association	Unscheduled readmissions	3.05	19,122	(+) Significance of condition in terms of costs and persons affected is assumed to be high. Data to control for patient severity is unavailable.
Beth Israel	Postoperative cerebral infarction rates	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of cellulites or decubitus following surgery	Not Found	Not Found	Cannot be determined

Set Name	Measure Name	Incidence Rate*	Estimated number of Maryland Discharges with Condition	Recommendation for Inclusion in Maryland Disparities Study (++) Most Promising (+) Promising (-) Least Promising
Beth Israel	Rates of septicemia following surgery	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of shock following surgery	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of coma following surgery or procedure	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of infection following surgery or procedures	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of hip fracture or fall following major surgery or procedure	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of surgical site reopening	Not Found	Not Found	Cannot be determined
Beth Israel	Miscellaneous complications rates	Not Found	Not Found	Cannot be determined
Beth Israel	Perforations or lacerations following a surgery or procedure	Not Found	Not Found	Cannot be determined
Beth Israel	Metabolic derangement following surgery or procedures	Not Found	Not Found	Cannot be determined
Beth Israel	Rates of venous thrombosis or pulmonary embolism following surgery or procedures	Not Found	Not Found	Cannot be determined
Rates represent proportion of persons discharged with surgery or procedures specified that develop specified condition, HCUP QI On-Line, National Association of Health Data Organizations (NAHDO), www.nahdo.org/ahcpr/main/index.htm				